STUDENT COPY

IBA

Name :	Batch:

MATH LECTURE - 06

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PART I: CLASS PRACTICE

GROUP 1: FINDING A SPECIFIC VALUE / AGE

1. A fence 320 feet long has wooden posts each 40 feet apart. How many posts are there?
   a. 7 b. 8 c. 9 d. 10 e. 11

2. A triangular garden has three border sides of 13, 12, and 5 meters respectively. There is a fence around it with wooden posts each 3 meters apart. How many posts are there?
   a. 9 b. 10 c. 11 d. 13 e. None on these

3. Neelim is twice as old as Tarique, who is three years older than Muib. If Neelim's age is five times Muib's age, how old in years is Tarique?
   a. 2 b. 4 c. 5 d. 8 e. 10

4. Few years back when they got married, Prova was 5 years older than her husband. However, 20 years back, Prova was twice as old as her husband. How old is Prova now?
   a. 20 years b. 24 years c. 25 years d. 30 years e. Cannot be determined

GROUP 2: WORK DONE PROBLEMS

5. *A*, *B*, and *C* together can finish a piece of work in 4 days. *A* alone can do it in 12 days, *B* alone can do it in 18 days. How long will *C* take to finish the work?
   a. 21 b. 16 c. 14 d. 9 e. 7

6. Zafar can hammer 20 nails in 6 minutes. Mariha can do the same job in only 5 minutes. How long will it take them to hammer 22 nails if Zafar hammers the first 5 nails, then Mariha hammers for 3 minutes, and finally Zafar finishes the job?
   a. 4.6 minutes b. 5.0 minutes c. 5.4 minutes d. 6.0 minutes e. 6.5 minutes

7. A 12-gallon tub has a faucet that lets water in at a rate of 3 gallons per minute, and has a drain that lets water out at a rate of 1.5 gallons per minute. If you start with 3 gallons of water in the tub, how long will it take to fill the tub completely?
   a. 3 minutes b. 4 minutes c. 6 minutes d. 7.5 minutes e. 8 minutes

GROUP 3: DIFFERENT RATE PROBLEMS

8. A certain power company charges Tk. 0.08 per watt-hour for the first 1000-watt hours and tk. 0.06 per watt-hour after that. If a man uses a 900-watt toaster for 5 hours, a 100-watt lamp for 25 hours, and a 5-watt clock for 400 hours, how much is he charged for the power he uses?
   a. Tk. 0.56 b. Tk. 0.64 c. Tk. 0.72 d. Tk. 560.00 e. Tk. 720.00

9. A telephone call from city X to city Y costs $1.00 for the first three minutes and $0.25 for every minute thereafter. What is the maximum length of time (in minutes) that a caller could talk for $3.00?
   a. 8 b. 10 c. 11 d. 12 e. 13

10. Cars are entering the parking lot of a suburban shopping mall at the rate of one car every three seconds and leaving at the rate of one car every seven seconds. The parking lot is filling at the rate of approximately one car every-
   a. 6 seconds b. $5\frac{1}{3}$ seconds c. $5\frac{1}{4}$ seconds d. $3\frac{3}{7}$ seconds e. $2\frac{1}{10}$ seconds

11. It costs g cents a mile for gasoline and m cents a mile for all other costs to run a car. How many dollars will it cost to run the car for 100 miles?

a. $\frac{g+m}{100}$ b. g + 0.1 m c. 100g+100m d. 100gm e. g + m

12. Dipita bought a crate of chocolate milk, estimating that only $\frac{1}{5}$ of the items would be saleable. In that case, her cost per saleable item would have been \$1.20. If it turned out that $\frac{1}{4}$ of the items were saleable, what would her actual cost per saleable item be?

a. \$0.96 b. \$1.00 c. \$1.16 d. \$1.24 e. \$1.50

GROUP 4: SET PROBLEMS

13. There are 40 students in a music club. Each of them can play either a guitar or a piano or both. If 30 students can play guitar, and 15 can play both, how many of them can play a piano?

a. 15 b. 20 c. 25 d. 30 e. None

14. In a survey, it was found that 65% of the people polled watched the news on television, 40% read in a newspaper, and 25% read a newspaper and watched the news on television. What percent of the people surveyed neither watched the news on television nor read a newspaper?

a. 10% b. 15% c. 20% d. 25% e. 30%

15. In BBA 26th batch, there are 120 students. Eighty of them play football, rest play basketball. Half of the students follow sports on TV and half follow in internet. If 45 of the students play football and follow sports on TV, how many of them play basketball and follow sports in internet?

a. 15 b. 25 c. 35 d. 40 e. None

GROUP 5: PERMUTATION, COMBINATION

16. Three flower-vessels are to be arranged in a row from five different colored vessels. How many different arrangements are possible?

a. 10 b. 15 c. 20 d. 60 e. None

17. A Council will send a team of 3 members to work on a certain mission. The Council has 4 seniors and 4 juniors. If a team consists of 1 senior and 2 junior, how many different such teams are possible?

a. 8 b. 16 c. 24 d. 32 e. 48

18. There are six different models that are to appear in a fashion show. Two are from Europe, two are from Asia, and two are from North America. If all the models from the same continent are to stand next to each other, how many ways can the fashion show organizer arrange the models?

a. 8 b. 24 c. 48 d. 64 e. 72

19. Bushra and Nayyir are among 7 students from whom 4 students are to be selected at random for a field trip organized by Professor Rabib. Of the different possible selections, how many contain neither Bushra nor Nayyir?

a. 5 b. 8 c. 14 d. 30 e. 35

20. There are 5 doors in IBA hostel lounge. Two are red colored and the others are green. In how many ways can a guy enter the room and leave the room from different colored doors?

a) 2 b) 5 c) 6 d) 12 e) None

GROUP 6: PROBABILITY

21. A bag contains 40 marbles, 26 red ones and 14 blue ones. Two marbles are picked at random from the bag without returning. What is the probability of picking a red marble first and then a blue marble?

a. $\frac{1}{12}$ b. $\frac{1}{4}$ c. $\frac{4}{9}$ d. $\frac{7}{30}$ e. None of these

22. From a bag containing 12 blue balls, 'y' yellow balls and no other balls, one ball is removed at random. If the probability of the removed ball being yellow is $\frac{2}{5}$, what is the number of yellow balls?

a. 7 b. 8 c. 9 d. 10 e. None of these

23. If an integer is randomly chosen from the first 50 natural number, what is the probability that a number with a digit of 3 will be selected?

a. $\frac{7}{25}$ b. $\frac{3}{10}$ c. $\frac{8}{25}$ d. $\frac{2}{5}$ e. $\frac{3}{5}$

24. A bag contains 7 white balls, 3 red balls and 2 black balls. A ball is picked from the bag at random. Find the probability of picking either a white or a black ball.

a. $\frac{1}{12}$ b. $\frac{1}{3}$ c. $\frac{3}{4}$ d. $\frac{1}{4}$ e. $\frac{7}{72}$

25. A bag contains 4 red marbles, 10 blue marbles, and 6 yellow marbles. If 3 marbles are removed at random and no marble is returned to the bag after removal, what is the probability that all three marbles will be blue?

a. $\frac{1}{2}$ b. $\frac{1}{8}$ c. $\frac{3}{20}$ d. $\frac{2}{19}$ e. $\frac{3}{8}$

PART II: TAKE-HOME ASSIGNMENT

1. A fence open on both sides has 26 wooden posts each 10 feet apart. What is the length of the fence?

a. 225 feet b. 250 feet c. 260 feet d. 270 feet e. None of these

2. A square garden has a side of 6 meter and the garden is surrounded by a fence which has posts each 3 meters apart. How many posts are there?

a. 8 b. 9 c. 12 d. 13 e. None of these

3. Zafar is four times older than Rabib. However, 20 years later, he will be only twice as old as Rabib. What is Zafar's present age?

a. 10 years b. 24 years c. 26 years d. 40 years e. 42 years

4. 6 years ago, a father was seven times as old as his son. Again, 4 years later, the father will be only thrice as old as his son. How old is the son now?

a. 5 years b. 11 years c. 15 years d. 41 years e. 45 years

5. The sum of ages of 5 children born at the interval of 3 years each is 50 years. What is the age of the youngest child?

a. 4 years b. 8 years c. 10 years d. 12 years e. None of these

6. It costs 10 cents a kilometer to fly and 12 cents a kilometer to drive. If you travel 200 kilometers, flying x kilometers of the distance and driving the rest, then what is the cost of the trip in dollars?

a. 24 – 0.2x b. 24 + 2x c. 24 – 2x d. 24 – 0.02x e. 2400 – 2x

7. Alfy drove a total of 700 miles on a business trip. If his car averaged 35 miles per gallon of gasoline and gasoline costs an average of $1.25 per gallon, how much did he spend on gasoline for this trip?
   a. $17.50 b. $25 c. $35 d. $70 e. $250

8. Orpa's allowance is Tk. 1.25 per week. Umama's allowance is Tk. 0.25 per day. How long will they have to save, if they both save their allowances together, before they can buy a walkie-talkie that costs Tk. 24?
   a. 6 weeks b. 8 weeks c. 10 weeks d. 13 weeks e. 16 weeks

9. At a certain factory, it takes five metal fasteners to attach a muffler to a car. If a box containing 500 fasteners cost $42, how much will it cost to buy the exact number of fasteners needed to attach 300 mufflers?
   a. $14 b. $36 c. $56 d. $126 e. $4,200

10. A wall with no window is 11 feet high and 20 feet long. A large roll of wallpaper costs $25 and will cover 60 square feet of wall. A small roll of wallpaper costs $6 and will cover 10 square feet of wall. What is the least cost for enough wallpaper to cover the wall?
   a. $75 b. $99 c. $100 d. $120 e. $132

11. All of the 80 students in a class took either a history course, or a math course or the both. If 50 students took history, and 30 took the both, how many of them took math course?
   a. 20 b. 30 c. 40 d. 60 e. 80

12. Machine A can produce 40 bolts per minute, while Machine B can produce only 30 per minute. Machine A begins alone to make bolts but it breaks down after 1.5 minutes and Machine B must complete the job. If the job requires 300 bolts, how long does the whole operation take?
   a. 7.5 minutes b. 8 minutes c. 8.5 minutes d. 9 minutes e. 9.5 minutes

13. A can do a piece of work in 10 days, while *B* alone can do it in 15 days. They work together for 5 days and the rest of the work is done by *C* in 2 days. If they get Tk. 400 for the whole work, what should be *A*'s share?
   a. 50 b. 75 c. 150 d. 175 e. 200

14. X can do a work in 12 days. Y is 60% more efficient than X. How many days will Y require to complete the same work?
   a. 8 b. 7.5 c. 7.2 d. 6.66 e. none of these

15. In BBA 26th batch, 40 percent of the students are instructors at Mentors' and the rest are not instructors. Half of the students are from English Medium and half are from National Curriculum. If 10 percent of the students are instructors and from English Medium, and 40 students are not instructors and from National Curriculum, how many students are instructors and from National Curriculum?
   a. 60 b. 70 c. 40 d. 100 e. 90

16. A club has 7 male and 6 female members. The club is choosing a committee of 6 members. The committee must have 3 male and 3 female members. How many different committees can be chosen?
   a. 25,200 b. 720 c. 700 d. 560 e. 55

17. Muib will be the president of a club. In how many ways can a club of 5 members be formed from a total of 8 people given that Disha must be one of them?
   a. 21 b. 35 c. 56 d. 70 e. 120

18. At a car dealership, each of three cars must be parked in one of six adjacent parking spaces, provided that there is exactly one empty parking space between any two occupied spaces. How many ways can the three cars be arranged in the six spaces?
   a. 20 b. 16 c. 12 d. 4 e. 2

19. Nadif has 5 different colored shirts and 3 different colored ties. In how many ways can he choose a shirt and a tie?
   a. 1 b. 3 c. 5 d. 8 e. 15

20. A credit card number has 5 digits (between1 to 9 only). The first two digits are 1 and 2 in that order, the third digit is greater than 6, the fourth is divisible by 3 and the fifth digit is a prime number. How many different credit card numbers can be formed under the given conditions?
   a. 27 b. 36 c. 45 d. 72 e. 112

21. A coin is tossed six times. What is the probability that the fourth toss would turn a head?

a. $\frac{1}{2}$ b. $\frac{2}{3}$ c. $\frac{1}{3}$ d. $\frac{1}{4}$ e. None

22. Of a set of 36 pencils, $\frac{1}{3}$ are blue. If exactly 8 of the blue pencils do not have erasers, then what is the probability of getting a blue pencil having erasers if one pencil is selected at random from the 36 pencils?

a. $\frac{1}{9}$ b. $\frac{2}{9}$ c. $\frac{1}{3}$ d. $\frac{5}{9}$ e. $\frac{7}{9}$

23. A jar contains marbles of 4 different colors. The number of blue marbles is three times as many as the yellow ones. The number of red marbles is half that of the yellow ones. The number of orange marbles is equal to the number of red ones. What is the probability of getting an orange marble if you pick one randomly?

a. $\frac{1}{10}$ b. $\frac{3}{20}$ c. $\frac{1}{5}$ d. $\frac{6}{10}$ e. None of these

24. What is the probability of rolling 3 six-sided dice, and getting a different number on each dice?

a. $\frac{1}{12}$ b. $\frac{1}{3}$ c. $\frac{4}{9}$ d. $\frac{5}{9}$ e. $\frac{7}{18}$

25. In a group of 30 students, 14 are girls and 4 of them can speak French. All of the boys can speak French. If a student is selected randomly from the group, find the probability that the selected student is a girl who cannot speak French.

a. $\frac{2}{15}$ b. $\frac{1}{3}$ c. $\frac{2}{7}$ d. $\frac{5}{7}$ e. None of these

PART III: REVIEW LESSON FOR THE NEXT LECTURE

ANGLES

An angle is formed when two lines intersect at a point.

 # Classification of Angles:

- An acute angle measures less than 90°.
- A right angle measures exactly 90°
- An obtuse angle measures between 90° and 180°
- A straight angle measures exactly 180°
- A reflex angle measures between 180° and 360°.

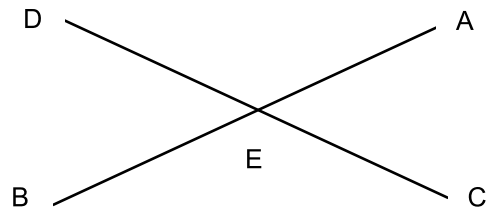
If the sides of the angle form a straight line, then the angle is said to be a straight angle and has 180°.

A circle has 360° and a straight angle is a turning through a half circle. All other angles are either greater or less than 180°.

If two angles have a common vertex and a common leg, and lie at opposite directions of the common leg, they are called **Adjacent angles**.

Two angles are called **Complementary angles** or **Complements** of one another if their sum is 90°. For example, an angle of 30° and an angle of 60° are complementary.

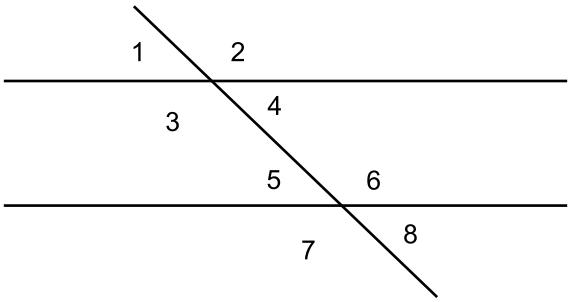
Two angles are called **Supplementary angles** or **supplements** of one another if their sum is 180°. For example, an angle of 82°and an angle of 98° are supplementary. In the given figure, ∠AED is a supplement of ∠BED and vice versa.



When a pair of straight lines intersect, the opposite angles are called **Vertical angles** and are equal. In the above diagram, ∠AED = ∠BEC [Vertical angles] and ∠BED = ∠CEA.

When a pair of parallel lines are crossed by a third straight line (called a transversal), then all the acute angles formed are equal, and all of the obtuse angles are equal. **[Fred's Theorem]**

Example: In the diagram below, angles 1, 4, 5, and 8 are all equal. Angles 2, 3, 6, and 7 are also equal. Here, ∠5 and ∠4 are called alternate angles, and ∠5 and ∠1 are called corresponding angles. Moreover, ∠3 + ∠5 = 180°.



TRIANGLES

A triangle is a closed figure with three sides, each side being a line segment. The sum of the angles of a triangle is always 180°.

 # Classification of Triangles:

- **Scalene triangles** are triangles with no two sides equal. Scalene triangles also have no two angles equal.
- **Isosceles triangles** have two equal sides and two equal angles which are opposite to the equal sides.
- **Equilateral triangles** have all three sides and all three angles equal. Since the sum of the three angles of a triangle is 180°, each angle of an equilateral triangle is 60°.

A **Right triangle** has one angle equal to a right angle (90°). The sum of the other two angles of a right triangle is, therefore, 90°. In a right triangle, the longest side (opposite to the right angle) is called a **Hypotenuse**. According to Pythagoras theorem, $(\text{Base})^2 + (\text{Height})^2 = (\text{Hypotenuse})^2$

In any triangle, the sum of the length of two sides must be greater than the third side.

In any triangle, the length of any side must be greater than the difference between the length of the other two sides.

An **Exterior angle** of a triangle is equal to the sum of the two **opposite Interior angles**.

In any triangle, the angle opposite to the greater side is greater than the angle opposite to the smaller side and vice versa.

In any equilateral triangle, the medians are also the perpendiculars from vertices as well as angle bisectors.

In isosceles triangles, the median from the vertex joining the equal sides is perpendicular to the base as well as an angle bisector.

A median divides the triangle into two triangles of equal area.

Two triangles are called congruent if they are equal in all aspects and can be superimposed on one another.

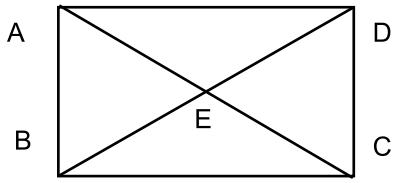
QUADRILATERALS

- Quadrilaterals are four-sided enclosed figures which has four interior angles.
- Summation of all the four angles is 360 degree.

I. RECTANGLE:

A **Rectangle** is a parallelogram in which all the angles are right angles. Since a rectangle is a parallelogram, all of the laws which apply to a parallelogram apply to a rectangle. The additional properties are:

- The angles are all right angles. ($\angle A = \angle B = \angle C = \angle D$)
- The diagonals of a rectangle are equal. (AC = BD)

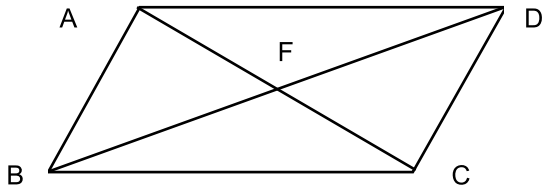


II. PARALLELOGRAM:

A **Parallelogram** is a four-sided figure with each pair of opposite sides parallel.

 # Properties of a Parallelogram:

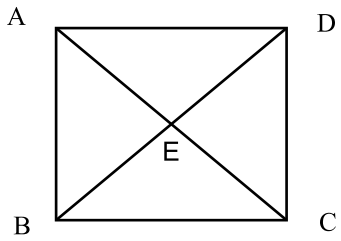
- Each pair of opposite sides is equal. (AD = BC, AB = DC)
- The diagonals bisect each other. (AF = FC, DF = FB)
- The opposite angles are equal. ($\angle A = \angle C$, $\angle D = \angle B$)
- One diagonal divides the parallelogram into two congruent triangles. Two diagonals divide the parallelogram into two pairs of congruent triangles.
- The four triangles created by the diagonals are equal in area.



III. SQUARE:

A **Square** is a rectangular rhombus. Thus the square has the following properties:

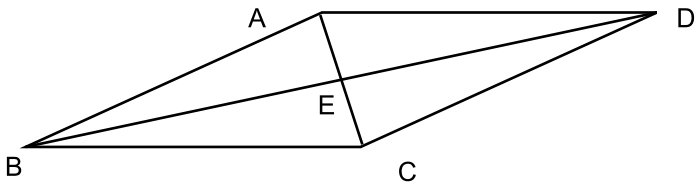
- All four sides are equal. (AB = BC = CD = DA)
- Opposite pairs of sides are parallel. (AD || BC, AB || DC)
- Diagonals are equal, perpendicular to each other, and bisect each other. (AC = BD, AC $\perp$ BD, AE = EC = DE = EB)
- All the angles are right angles (90°). ($\angle A = \angle B = \angle C = \angle D = 90°$)
- Diagonals intersect the vertices at 45°. ($\angle DAC = \angle BAC = 45°$, and similarly for the other 3 vertices)



IV. RHOMBUS:

A **Rhombus** is a parallelogram with four equal sides. Since a rhombus is a parallelogram, all of the laws which apply to a parallelogram, apply to a rhombus. The additional properties are

- The four sides of a rhombus are equal. (AB = BC = CD = DA)
- The diagonals of a rhombus are perpendicular to each other. (AC⊥ DB)
- The diagonals of a rhombus bisect the vertex angles. (∠DAC = ∠BAC = ∠DCA = ∠BCA and ∠ADB = ∠CDB = ∠ABD = ∠CBD)



Name……

Review Test on lecture 5
10 marks, 10 minutes

Batch……

1. A bicyclist rode from point A to point B in 90 minutes. His return trip along the same route took only 45 minutes. If the distance from A to B is 36 miles, what was the bicyclist's average speed, in miles per hour, for the entire trip?
   a. 16 b. 24 c. 30 d. 32 e. 36
2. A plane travelling at 600 miles per hour is heading for Chittagong Airport. At 3:58 p.m., it is 30 miles away from the airport. At what time will it arrive at the airport?
   a. 3:59 p.m. b. 4:00 p.m. c. 4:01 p.m. d. 4:03 p.m. e. 4:05 p.m.
3. A man can row down a 10-mile stream in 2 hours and can return in upstream in 5 hours. What is his average rate, in miles per hour, for the entire trip?
   a. $\frac{10}{7}$ b. $\frac{7}{2}$ c. $\frac{20}{6}$ d. 3 e. $\frac{20}{7}$
4. Speed of a boat in still water is 9 km/h and the speed of the stream is 1.5 km/h. A man rows to a place at a distance of 105 km and comes back to the starting point. The total time taken by him is:
   a. 16 hours b. 18 hours c. 20 hours d. 24 hours e. 30 hours
5. How many seconds will a train 100 meters long take to cross a bridge 150 meters long if the speed of the train is 36 km/h?
   a. 18 b. 22 c. 28 d. 35 e. 25
6. A motorbike traveling at 120 km/h overtakes a train traveling at 66 km/h in 20 seconds. What is the length of the train in meters?
   a. 250 m b. 280 m c. 300 m d. 400 m e. None of these
7. Faiza ran a 2 mile race at an average speed of 8 miles per hour. If Zafar ran the same race at an average speed of 6 miles per hour, how many minutes longer than Faiza did Zafar take to complete the race?
   a. 20 b. 15 c. 12 d. 9 e. 5
8. How long will it take for a faucet that pours water at a rate of 10 gal /min to fill a cube 2 feet on each side? [1 cubic feet = 7.5 gal]
   a. 4 minutes b. 5 minutes c. 6 minutes d. 6.5 minutes e. 7 minutes
9. Neelim runs 25% faster than Tamjid and is able to beat him by 8 meters at the end of a race. What is the length of the race in meters?
   a. 35 m b. 38 m c. 40 m d. 45 m e. 50 m
10. A train travels at 22 mph, and a car travels at 88 mph. They started from the same point but the train left 3 hours before. How long would it be until the car catches up with the train after the car started its journey?
    a. 3 hr b. 3.5 hr c. 4 hr d. 5 hr e. 1 hr

Answer Sheet

1. ☐ ☐ ☐ ☐ ☐
2. ☐ ☐ ☐ ☐ ☐
3. ☐ ☐ ☐ ☐ ☐
4. ☐ ☐ ☐ ☐ ☐
5. ☐ ☐ ☐ ☐ ☐
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SCORE……..

REMARKS